

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Revisions to Parts 2 and 25 of the)	
Commission's Rules to Govern the Use of)	
Earth Stations Aboard Aircraft Communicating)	IB Docket No. 12-376
with Fixed-Satellite Service Geostationary-)	
Orbit Space Stations Operating in the 10.95-)	
11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and)	
14.0-14.5 GHz Frequency Bands)	
)	
Service Rules and Procedures to Govern the)	
Use of Aeronautical Mobile Satellite Service)	IB Docket No. 05-20
Earth Stations in Frequency Bands Allocated)	(proceeding terminated)
to the Fixed Satellite Service)	

To: The Commission

**COMMENTS OF
THE BOEING COMPANY**

The Boeing Company ("Boeing") files these comments in support of the Commission's Notice of Proposed Rulemaking ("Notice") proposing to elevate the Earth Stations Aboard Aircraft ("ESAA") service to primary status in the 14.0-14.5 GHz band (Earth-to-space) band.¹ The Commission has taken important steps in the ESAA Order to advance the goal of ubiquitous mobile broadband on sea, land, and air. There remains, however, a final, and crucial, step still to be taken to realize the promise of mobile Fixed Satellite Service ("FSS"). Elevation to primary status in the 14.0-14.5 GHz band will enable ESAA to be a full member of the mobile satellite-delivered broadband services triad of Earth Stations aboard Vessels ("ESV"), Vehicle Mounted

¹ *In the Matter of Revisions to Parts 2 and 25 of the Commission's Rules to Govern the Use of Earth Stations Aboard Aircraft Communicating with Fixed-Satellite Service Geostationary-Orbit Space Stations Operating in the 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and 14.0-14.5 GHz Frequency Bands, IB Docket No. 12-267, Notice of Proposed Rulemaking and Report and Order, FCC 12-161 (rel. Dec. 28, 2012) ("ESAA Order").*

Earth Stations (“VMES”), and ESAA. More importantly, primary status will extend priority of ESAA over the operations of services, ensuring that it is protected from interference in this intensively-used frequency band. Primary status will also simplify coordination among both existing and proposed services. The increased reliability of a protected uplink band will encourage expanded development of and investment in innovative new applications that will benefit passengers, flight crews, and United States competitiveness in aerospace and air transport industries. Boeing therefore strongly supports the proposed rule and urges the Commission to adopt and implement it without delay.

Boeing is the world’s largest aerospace company and a leading manufacturer of commercial and military aircraft and satellites. Boeing is also a world leader in the development and deployment of in-flight broadband, having operated an in-flight broadband service for more than a decade to support VIP aircraft operated by the U.S. government. Boeing understands from long experience that reliable access to spectrum is a key prerequisite for innovators who develop new products and for the customers that depend on them. Manufacturers and satellite operators have invested billions in developing ESAA technology, and airlines have made further investments in installing the necessary hardware on thousands of aircraft. Prompt elevation of ESAA to full primary status would affirm this investment and promote further investment and deployment in this highly competitive industry.

I. REGULATORY PARITY WITH ESV AND VMES REQUIRES FULL PRIMARY STATUS FOR ESAA

As the Commission has acknowledged, ESAA is the “third leg” of mobile FSS applications.² Indeed, the name of the service was selected to “convey the technical and

² *ESAA Order*, ¶ 2.

regulatory similarities to ESV and VMES, analogous mobile applications of the FSS.”³ Although the service was originally proposed as a secondary allocation in the existing Mobile-Satellite Service (“MSS”) allocation in the 14.0-14.5 GHz band, operational effectiveness and regulatory parity in today’s operating environment requires full primary status for ESAA. In addition, after a decade of experience with AMSS/ESAA operations, the Commission and incumbent operators in the band can now be confident that such operations do not cause harmful interference to primary services.

In 2003, the World Radiocommunication Conference (“WRC-03”) concluded that appropriately designed Aeronautical Mobile Satellite Service (“AMSS”) systems could operate on a secondary basis in the 14.0-14.5 GHz band without causing harmful interference to primary services.⁴ Subsequently, Boeing advocated for, and the Commission adopted, a U.S. allocation for AMSS in the United States paralleling the ITU allocation, including secondary status in the 14.0-14.5 GHz band.⁵

In the decade since the AMSS allocation was adopted, however, the Commission has established new allocations and service rules authorizing ESVs and VMES as primary applications of the FSS.⁶ As a result, there are now thousands of mobile FSS terminals in

³ *Id.*, ¶ 11.

⁴ *Service Rules and Procedures to Govern the Use of Aeronautical Mobile Satellite Service Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service*, IB Docket No. 05-20, Notice of Proposed Rulemaking, FCC 05-14, ¶ 2 (2005) (“AMSS NPRM”).

⁵ Amendment of Parts 2, 25, and 87 of the Commission’s Rules to Implement Decisions from the World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range, ET Docket No. 02-305, Report and Order, 18 FCC Rcd 23426, ¶ 76 (2003) (“Above 28 MHz Allocation Order”).

⁶ *Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands*, IB Docket No. 02-10, Report and Order, FCC 04-286, ¶ 79 (rel. Jan. 6, 2005) (“ESV Report and Order”); Amendment

operation throughout the United States and U.S. waters, and continued growth can be expected. Thus, although secondary status may have been sufficient in 2003 when AMSS was first being considered, the operating environment today in the 14.0-14.5 GHz band is dramatically different and the potential for interference from other mobile FSS services is much greater. In addition, ESV, VMES, and ESAA have co-evolved, with each subsequent service being based on the technical characteristics and service rules of the prior service.⁷ As the Commission has acknowledged, these services have very similar operating principles⁸ and Boeing and others routinely deliver broadband to ships, vehicles, trains, and aircraft using the same hardware, satellites, transponder beams, and control stations.⁹ Full co-primary status is therefore necessary and appropriate for ESAA commensurate with its role as the third leg of mobile FSS.

II. ESAA MUST BE FULLY PRIMARY BEFORE CONSIDERING NEW SECONDARY SERVICES

The Commission should establish regulatory certainty for existing services before considering the introduction of additional services in the 14.0-14.5 GHz band. Recently, the Commission released an NPRM considering an air-to-ground data service proposed by Qualcomm Inc. (“Qualcomm”) that would operate in the 14.0-14.5 GHz band.¹⁰ As multiple

of Parts 2 and 25 of the Commission’s Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service, IB Docket No. 07-101, Report and Order, 24 FCC Rcd 10414 (2009) (“VMES Order”).

⁷ See FCC 09-64, ¶ 2 (2009) (“VMES Order”); ESAA Order, ¶ 5.

⁸ ESAA Order, ¶¶ 8, 11.

⁹ Letter from Bruce A. Olcott, Counsel, The Boeing Company, to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket 05-20 (Jan. 7, 2011).

¹⁰ Expanding Access to Broadband and Encouraging Innovation through Establishment of an Air-Ground Mobile Broadband Secondary Service for Passengers Aboard Aircraft in the 14.0-14.5

commenters have previously explained, the Commission should not introduce new non-satellite services in this band, if ever, until it has established regulatory certainty for incumbent services.

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ESAA is a new service, but in-flight broadband operations are well established and multiple licenses have been issued over the past decade to provide such services.¹² These longstanding existing services require certainty with regard to future use and status before further allocation table changes are formally considered. The Commission acknowledged in the Air-to-Ground NPRM that “the mobility and ubiquity of FSS earth stations in the band necessitate great caution in preventing harmful interference” and that “secondary-status services may not cause harmful interference to primary-status services.”¹³ Likewise, the Qualcomm petition focuses on “[w]hether the proposed secondary service causes harmful interference to a primary service.”¹⁴ At this time, however, ESAA remains a secondary service in the transmit band, which is just as critical as the receive bands for which ESAA already has primary status. Full primary status is necessary to provide existing operations a stable and predictable regulatory operating environment that will validate current investment and encourage further investment.

GHz Band, GN Docket No. 13-114, RM-11640, Notice of Proposed Rulemaking, FCC 13-66 (May 9, 2013)(“*Air-to-Ground NPRM*”).

¹¹ Comments of Row 44, Inc. at 12, RM-11460, IB Docket No. 05-20 (Jul. 16, 2012); Comments of the Satellite Industry Association at 9, RM-11460 (Sep. 29, 2011).

¹² *ESAA Order*, ¶ 9 (citing licenses of Panasonic Avionics Corporation, Row 44 Inc., ViaSat Inc., ARINC Incorporated, and Boeing).

¹³ *Air-to-Ground NPRM*, ¶ 27.

¹⁴ Qualcomm Inc. Petition for Rulemaking at 20, Amendment Of The Commission's Rules To Establish A Next-Generation Air-Ground Communications Service On A Secondary Licensed Basis In The 14.0 to 14.5 GHz Band, RM RM-11640 (Jul. 7, 2011).

Equally important, promptly establishing primary status for ESAA in the 14.0-14.5 GHz band will provide regulatory certainty during the Commission's analysis of newly proposed services. As Boeing has explained, the record must be clear as to whether the proposed services can tolerate interference commensurate with secondary status in the intensively used band, even before adoption of ESAA.¹⁵ The Commission should ensure that all parties have the most accurate view of the actual spectrum environment by promptly following through on its proposed elevation of ESAA to co-primary status in the 14.0-14.5 GHz band.

III. FULL PRIMARY STATUS FOR ESAA HAS THE POTENTIAL TO STREAMLINE AIRCRAFT COMMUNICATIONS, IMPROVING PASSENGER SERVICES AND FLIGHT OPERATIONS

Primary status for ESAA provides the opportunity to unlock the full potential of in-flight two-way broadband to streamline aircraft operations and improve customer service, operational efficiency, and situational awareness. The operation of the aircraft, as well as the business of air transportation, requires enormous amounts of data and timely exchange of information between the aircraft and systems on the ground. The nature of air travel means that aircraft and crews are regularly disconnected from ground-based business information infrastructure for most of each day, sometimes for as long as 14 hours at a time. To overcome this, airlines rely on a patchwork of communications systems to meet the enormous data needs of passenger service and logistics as well as flight operations.¹⁶ Reliable, high-bandwidth ESAA service may offer replacements to

¹⁵ Reply Comments of The Boeing Company at 4-6, Amendment of the Commission's Rules to Establish a Next-Generation Air-Ground Communications Service on a Secondary Licensed Basis in the 14.0-14.5 GHz Band, RM-11640 (July 31, 2012).

¹⁶ Passenger information and entertainment is generally passed through short range wireless local area network ("WLAN") connections. Critical information is transmitted over low-bandwidth systems such as Aircraft Communications Addressing and Reporting System ("ACARS") and Very High Frequency Digital Link ("VDL2"). *See also ESAA Order*, ¶ 9 n.6.

many of the existing systems, improving connectivity and centralizing data sources for improved efficiency.

Furthermore, broadband connectivity will allow the airlines to improve their operational efficiency by enabling real-time monitoring of equipment and inventories — allowing for faster turn-around of aircraft at the gate — as well as dynamic weather maps, crew information services and other non-safety-of-life services. The reliability afforded by full primary status in the 14.0-14.5 GHz band will allow more uses of ESAA and significant efficiency gains.

A. The Reliability of Primary Status ESAA Can Expand Current Passenger Services and Reduce Crew Workload

Typically, in-flight broadband has been thought of as an amenity for passengers, offering expanded access to entertainment and communications. In addition to providing a new revenue stream and service area for carriers to compete in, it has also brought broadband to an underserved sector of America.¹⁷

In-flight broadband is not limited to entertainment and passenger connectivity, however. The improved reliability afforded by full primary status would permit integration of ESAA capabilities into a range of airline operations. For instance, airline flight operations centers need to know that they will have the aircraft and crew they need in the right places for upcoming flights. Ground operations need to know where to bring fuel and catering items to service their gates. Passengers need to know what they are supposed to do if their flight is delayed or they are rerouted. The information driving these functions, although critical to the smooth operation of the airline, is generally not available until after arrival at the gate, typically through a wireless LAN connection at the terminal. With dependable access to high-bandwidth always-on Internet

¹⁷ *ESAA Order*, ¶ 5.

access, crews can contact the ground to arrange onward connections or other services for passengers. Administrative materials can be completed and transferred in-flight, allowing faster crew changes and turnaround of the aircraft.

Another application of expanded in-flight connectivity is telemedicine, which can ensure better care for passengers suffering medical incidents in-flight as well as avoiding medical diversions which can cost thousands of dollars and delay hundreds of passengers.¹⁸ Some telemedicine systems use only a satellite phone, but more advanced diagnostic packages include the transmission of vital signs, still images, voice and video, which requires higher throughput and more reliable Earth-to-space communication.¹⁹ Broadly, the reliability of primary-status Earth-to-space transmissions will have a direct impact on the level of customer service and crew efficiency aboard aircraft, and the proposed elevation of ESAA to full primary status would maximize both of these important capabilities.

B. Improved ESAA Reliability Will Benefit Flight Operations and the Air Transportation Business

The efficiency gains available from fully primary ESAA may be even more dramatic in the actual operation of the aircraft. In the competitive air transport industry, the in-use time of an aircraft is crucial to the success of an airline, and timely information is key to minimizing delays and maximizing utilization.

For instance, pilots must have the most up-to-date information about conditions affecting their aircraft, including the weather and air traffic control situation, in order to fly as efficiently

¹⁸ *Telemedical assistance for in-flight emergencies on intercontinental commercial aircraft*, J TELEMED TELECARE 2009; 15(8):409-13.

¹⁹ Emergency Telemedicine System Offers In-flight Medical Advice, Occupational Health and Safety Online (Sep. 23, 2010) (available at <http://ohsonline.com/articles/2010/09/23/10-emergency-telemedicine-systems-offer-in-flight-medical-advice.aspx>).

as possible. The Federal Aviation Administration has adopted rules permitting Electronic Flight Bags (“EFB”) to streamline aircraft operations,²⁰ and has recently approved tablet computers as EFBs.²¹ EFBs have simplified many of the functions laboriously performed by pilots and crews, but their value is limited to the information that can be loaded onto them and transmitted from them. Only satellite broadband provides the high-bandwidth, always-on connectivity necessary to maximize the value of EFBs and other onboard data systems.²² ESAA will enable pilots to take full advantage of the greater functionality of EFBs, such as by providing access to real time views of the weather and air traffic in their area.

When problems develop, mechanics need to know the details of the aircraft and systems status before they can begin diagnosis and repair. Although aircraft generate voluminous data on the functioning of all components, such data is often stored onboard the aircraft and is not available to mechanics until the aircraft has arrived at the gate.²³ Reliable in-flight broadband can allow aircraft to continuously feed data into a maintenance database, which enables pilots to perform corrective operations in flight and allows the airline to have mechanics, parts, and equipment prepositioned to make any needed repairs, even hours before a plane lands.²⁴ This

²⁰ FAA Advisory Circular, Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices, AC No. 120-76A (Mar. 7, 2003).

²¹ The Apple iPad and Other Suitable Tablet Computing Devices as Electronic Flight Bags (EFB), Information For Operators 11011, Federal Aviation Administration (May 13, 2011).

²² EFBs for the NextGen Operating Environment at 17, Jeppesen (May 19, 2010) (available at <http://events.aviationweek.com/html/nextgen/May%2019.8am.Workshop%20B1%20-%20Ellerbrock.EFB%20for%20the%20NextGen%20Operating%20Environment.pdf>).

²³ The Airplane Doctors, Boeing Frontiers Magazine at 41 (August 2006) (available at http://www.boeing.com/news/frontiers/archive/2006/august/ts_sf09.pdf).

²⁴ Electronic Flight Bag: Real-time Information Across an Airline’s Enterprise, Aero Magazine (Quarter 2, 2008) (available at http://www.boeing.com/commercial/aeromagazine/articles/qtr_2_08/AERO_Q208_article4.pdf).

can help prevent precautionary diversions and reduce maintenance time, making aircraft more available to airlines and providing better, more reliable service to passengers. Full primary status for ESAA, including in the 14.0-14.5 GHz band, will enable the aircraft to operate more efficiently as a business and to provide better customer service, more amenities, and greater aircraft availability.

IV. CONCLUSION

Elevating ESAA to primary status in the 14.0-14.5 GHz transmit band will ensure effective spectrum coordination and high quality service for ESAA and other services both primary and secondary. This in turn will promote expanded use of ESAA in new passenger services and flight operations applications. Fully co-primary ESAA will facilitate greater investment and help maintain United States leadership in this developing and highly competitive industry. For these reasons Boeing strongly urges the Commission to adopt full primary status for ESAA in the 14.0-14.5 GHz without delay.

Respectfully submitted,

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